

DETAILED REMARKS

Office Action (OA) objected to drawings because the legend on the vertical axis of Fig. 3 was not consistent with the displayed data. Applicant corrected Fig. 3 by changing the legend of the vertical axis, which now is in agreement with the specification, and the displayed data. The description for Fig. 3 on page 4 of the application stated: "Fig. 3 shows elemental ratios of Si and N in TaSiN, where Ta is normalized to 1". The discussion of Fig. 3 stated on page 6 line 19 that: "... elemental ratios, or concentrations, with the Ta concentration normalized to 1 are given..". Accordingly the legend on the vertical axis of Fig. 3 should read: "Si or N/Ta". The replacement sheet with the corrected drawing is included as page 3 of the present amendment.

Along the same reasoning the specification has been amended to correct an inconsistency, which inconsistency lead to the OA objection of claim 12. The concentrations as given in claim 12 are correct, and are consistent with the already cited statement on page 6 line 19 of the specification, namely: "... with the Ta concentration normalized to 1..". The inconsistency objected to in the OA has been removed by amending the specification. The amended second paragraph of page 7 (lines 5 - 9) of the application is presented on page 4 of the present amendment. The term "to Ta" has been added on the second line of the paragraph, making it consistent with claim 12, and also in agreement with amended Fig. 3.

The OA rejected all considered claims under 35 U.S.C. 102(b) and 35 U.S.C. 103(a) as being anticipated or rendered obvious by Grant (6,423,619), and under 35 U.S.C. 102(e) and 35 U.S.C. 103(a) over Ngai (6,518,106). The basis of the rejection in all cases was: that since the cited prior art used, or mentioned, CVD as a method for depositing TaN and TaSiN, every desirable property achieved and claimed in the present invention must be extant in the TaN and TaSiN materials as they were brought forth by Grant and Ngai. Applicant would respectfully suggest, however, that as it is well known in the art, chemical vapor deposition (CVD) is an all encompassing term under which the actual details of any given deposition process determine the properties of the deposited material. The present invention teaches with exquisite precision all the details of the applied CVD process, and presents experimental results on the properties of the deposited materials; see pages 3 to 10 and Figs. 1 to 9 of the application. For TaSiN there is no teaching in either Grant or Nagai on how to reach the concentration ranges and

resistivities achieved and claimed in the present invention; no matter how obviously desirable some material properties might be, such as, for instance, low resistivity.

Regarding TaSiN Ngai teaches only a single property in detail, namely that they can achieve a workfunction range for TaSiN between 4.4eV and 4.8eV; column 3 lines 6 to 9. The OA stated in rejecting claim 14 of the present invention: "Regarding claims 14, 20 and 21, the TaSiN gate electrode in Ngai is used in an NMOS transistor; and it naturally covers a workfunction and a threshold as recited in the instant invention, as the TaSiN workfunction in Ngai can be adjusted in a wide range of from 4.4 eV to 4.8 eV." Applicant respectfully suggests that in using TaSiN as gate material for NMOS devices a workfunction below 4.4eV would be clearly desirable, since this would make it appear more like an n<sup>+</sup>-polysilicon, which has a workfunction of 4.1eV. Indeed, the present invention teaches TaSiN material with a workfunction as low as 4.31eV; see Fig. 8, and the specification from line 18 on page 8 till line 2 on page 9. Extending the workfunction range of TaSiN down to 4.31 is not anticipated by either Ngai or Grant, nor is it made obvious, since in spite of its clear advantages there is no teaching in the prior art of such a low workfunction value. Applicant would respectfully suggest that considering the ranges covered, the blanket rejection by the OA of claim 14 in the present invention is not warranted. Accordingly, applicant incorporated the workfunction limitation of claim 14, appropriately modified in view of Ngai, into independent claim 8 of the present invention.

Applicant cancels claims 1 -7 and 22 - 32 as per election dated 08/26/2004. In view of Ngai and Grant the amended claim set is directed toward TaSiN. Amended independent claim 8 includes the limitation of a workfunction with values outside the range taught by Ngai, while new claim 8, also in view of Ngai and Grant, leaves out the limitation regarding resistivity. Claims 9 - 11 are canceled as being directed toward TaN. Claim 14 is canceled as it now has been absorbed into claim 8. Claim 21 has been amended for the claimed NMOS threshold range to be consistent with the workfunction range of claim 8. It is known in the art that the n<sup>+</sup>-polysilicon workfunction is 4.1eV – also stated on line 3 page 9 of the application – and that an n<sup>+</sup>-polysilicon gate has a threshold of 0.15eV in NMOS devices. Independent claim 33 has been amended to be consistent with claim 8. Dependent claim 36 has been added regarding the originally claimed resistivity values of the TaSiN material. The rest of the claims are original, or are amended to reflect changed dependencies, and to correct objections and wordings.

CLOSING STATEMENTS

Applicant respectfully submits that as expressed in this amendment the claims now put forward only patentable subject matter.

Applicant submits that this application is now in condition for allowance, which action is respectfully requested.

Respectfully,



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